UNITED NATIONS

EP

UNEP/OzL.Pro.WG.1/40/2

Distr.: General
17 April 2018

Original: English

United Nations Environment Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Items 3–9 of the provisional agenda*

Issues for discussion by and information for the attention of the Open-ended Working Group of the Parties to the Montreal Protocol at its fortieth meeting

Note by the Secretariat

I. Introduction

1. The present note provides an overview of the issues on the provisional agenda for the fortieth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. Section II sets out a summary of issues for discussion by the Open-ended Working Group. Section III sets out information that will not be addressed by the Open-ended Working Group at its fortieth meeting but that is relevant to the implementation of decisions by the parties, which is to be addressed by the Thirtieth Meeting of the Parties in November 2018. More specifically, section III provides updates on the implementation of decision XXIX/11 on safety standards; decision XXVIII/2 on the amendment phasing down hydrofluorocarbons (HFCs), and specifically on the work of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in developing guidelines for funding the phase-down of hydrofluorocarbons in countries operating under paragraph 1 of Article 5 (Article 5 parties); and decision XXIX/24 on financial reports and budgets for the Montreal Protocol.

2. Further information on some of the agenda items will be provided in the addendum to the present note (UNEP/OzL.Pro.WG.1/40/2/Add.1) once the relevant reports by the Technology and Economic Assessment Panel have been finalized (see para. 16). The reports relate to agenda item 4 and its sub-items concerning the 2018 report of the Panel, as well as agenda item 6 (a) on the report of the Panel on energy efficiency while phasing down HFCs. The addendum sets out summaries of the reports of the Panel on those issues.

3. Furthermore, issues that are not directly related to follow-up on decisions will be addressed in an information note on issues that the Secretariat would like to bring to the attention of the parties (UNEP/OzL.Pro.WG.1/40/INF/2).

* UNEP/OzL.Pro.WG.1/40/1.

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II. Summary of issues for discussion by the Open-ended Working Group at its fortieth meeting

Agenda item 3

Kigali Amendment to the Montreal Protocol to phase down hydrofluorocarbons

4. As at 16 April 2018, a total of 31 parties to the Montreal Protocol had ratified the Amendment to the Montreal Protocol on Substances that Deplete de Ozone Layer (Kigali Amendment).[1] In accordance with its article IV, the Amendment will enter into force on 1 January 2019, having fulfilled the requirement for its entry into force of the deposit of at least 20 instruments of ratification, acceptance or approval by parties to the Montreal Protocol.

(a) Data reporting under Article 7 and related issues

5. At the Twenty-Ninth Meeting of the Parties, held in Montreal, Canada, from 20 to 24 November 2017, the contact group on data reporting and destruction that had been established at the thirty-ninth meeting of the Open-ended Working Group, held in Bangkok from 11 to 14 July 2017, was reconvened and continued its discussions. The co-chairs of the contact group, which was unable to conclude its work during the time allotted, reported to the plenary that the group had reached agreement on a draft decision on destruction technologies for HFCs and on the issue of trade with non-parties but not on the other issues on its agenda. The parties agreed that data reporting issues would be included in the agenda of the fortieth meeting of the Open-ended Working Group and that the Working Group would decide how best to proceed thereafter. The Co-Chair of the preparatory segment suggested that the Secretariat could incorporate the observations of the contact group into the documentation prepared for that meeting.

6. Accordingly, the note by the Secretariat on data reporting under Article 7 of the Montreal Protocol including related issues arising from the Kigali Amendment to the Montreal Protocol to phase down HFCs (UNEP/OzL.Pro.WG.1/40/3), sets out a summary of the status of the discussions in the contact group. The note outlines the issues that have been addressed and on which a way forward has been agreed and identifies issues that need further consideration.

Issues that have been addressed and on which a way forward has been agreed:

(a) Process for approving destruction technologies for HFCs;

(b) Trade with non-parties and associated reporting;

Issues for further consideration:

(c) Timeline for reporting of baseline data for HFCs by Article 5 parties;

(d) Global-warming-potential values for HCFC-141 and HCFC-142;

(e) Revised data reporting forms and associated instructions, including the reporting of HFC mixtures and blends.

7. The Open-ended Working Group may wish to decide on how to take the remaining issues forward.

(b) Destruction technologies for controlled substances (decision XXIX/4)

8. During 2017, the parties discussed the process of approving destruction technologies for HFCs (substances listed in Annex F) so that when the parties begin to implement the control measures to phase down HFCs, they may destroy unwanted amounts of substances using technologies approved by the parties. The destroyed amounts would be subtracted from calculated production after the control measures become binding in 2019 following the entry into force of the Kigali Amendment for those parties that have ratified, accepted or approved it by that date.

9. Furthermore, paragraph 6 of Article 2J of the Montreal Protocol requires that "each party manufacturing Annex C, Group I, or Annex F substances shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its emissions of Annex F, Group II, substances generated in each production facility that manufactures Annex C, Group I, or Annex F substances are destroyed to the extent practicable using technology approved by the parties in the same twelve-month period." Paragraph 7 of Article 2J further states that "each party shall ensure

[1] See UNEP/OzL.Pro.WG.1/40/INF/3 on the status of ratification of the Kigali Amendment.

that any destruction of Annex F, Group II, substances generated by facilities that produce Annex C, Group I, or Annex F substances shall occur only by technologies approved by the parties." The provisions are applicable to Article 5 parties and parties not operating under paragraph 1 of Article 5 (non-Article 5 parties).

10. By its decision XXIX/4, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel to report by 31 March 2018, and if necessary to submit a supplemental report to the Open-ended Working Group at its fortieth meeting, on:

(a) An assessment of the destruction technologies as specified in the annex to decision XXIII/12 with a view to confirming their applicability to HFCs;

(b) A review of any other technology for possible inclusion in the list of approved destruction technologies in relation to controlled substances.

11. In the same decision, the Twenty-Ninth Meeting of the Parties invited parties to submit to the Secretariat by 1 February 2018 information relevant to the report to be prepared by the Technology and Economic Assessment Panel on the tasks referred to in paragraph 10 above. The Secretariat has received submissions from 10 parties: Armenia, Australia, Canada, China, the European Union, Japan, Luxembourg, Mexico, the United States of America, Venezuela (Bolivarian Republic of). The information that parties have confirmed as non-confidential has been compiled in a separate document and will be posted on the meeting portal for the fortieth meeting of the Open-ended Working Group.

12. The Technology and Economic Assessment Panel established a task force to respond to the decision, and an advance version of the report by the task force was issued on 3 April 2018 as volume 2 of the 2018 report of the Panel.

13. The task force assessed the approved destruction technologies listed in the annex to decision XXIII/12 and their applicability to HFCs, as well as other technologies for consideration for possible inclusion in the list of approved technologies. The task force presented the details of its assessment of and the recommendations for approved destruction technologies in chapter 3 and the other technologies in chapter 4 of its report . The task force further presented a summary table of the recommendations on each technology in chapter 5 of its report and a written summary in appendix 3 of the same report. Chapter 5 and appendix 3 are reproduced in annexes I and II to the present note.[2]

14. In assessing the technologies, the task force used the same requirements that were used previously for ozone-depleting substances, namely destruction and removal efficiency of a minimum of 99.99 per cent for concentrated sources or 95 per cent for diluted sources, and demonstration that hydrogen fluoride emissions are less than 5 mg/Nm^3 and carbon monoxide emissions are less than 100 mg/Nm^3. The task force made the following observations:

(a) Thermal oxidation and plasma arc technologies that have already met the performance criterion for chlorinated dioxins and furans for the destruction of ozone-depleting substances are considered capable of meeting the same performance criterion when used for the destruction of HFCs;

(b) The available data for thermal oxidation and plasma arc technologies suggest that fluorinated dioxins and furans are much more difficult to form, and are not formed under conditions where chlorinated dioxins are formed;

(c) Since HFCs may contain ozone-depleting substances as impurities or as part of a mixed waste, dioxin/furan analysis would be appropriate and may be mandatory under local requirements;

(d) For particulates, approved thermal oxidation and plasma arc destruction technologies for ozone-depleting substances are considered capable of meeting the same performance criterion when used for HFC destruction. However, analysis of total suspended particulates could be required as they could be introduced by other waste streams to be co-destroyed with ozone-depleting substances or HFCs;

(e) Owing to the unique and varied methods involved in conversion (or non-incineration) technologies,[3] the task force considered it necessary that these technologies demonstrate that they can meet all of the emissions performance criteria;

[2] The format has been altered from the original version in the report of the task force.

[3] Conversion or non-incineration technologies irreversibly transform halocarbons (including to other saleable products, e.g., acids, vinyl monomers etc.). They primarily rely on chemical transformation to destroy substances.

(f) In a number of cases, the task force was unable to make a recommendation without additional information.

15. The Panel will be issuing a supplemental report for the Open-ended Working Group that takes into account the further information that it has received on the destruction technologies. A summary of the supplemental report will be provided in the addendum to the present note. The new information may induce substantive changes in the recommendations provided by the task force.

Agenda item 4

Technology and Economic Assessment Panel 2018 report

16. The Technology and Economic Assessment Panel 2018 report consists of the following five volumes:

(a) Volume 1: Decision XXIX/9: Hydrochlorofluorocarbons and decision XXVII/5 (March 2018);

(b) Volume 2: Decision XXIX/4: Destruction technologies for controlled substances (April 2018);

(c) Volume 3: Technology and Economic Assessment Panel 2018 progress report (May 2018) containing, inter alia, process agent issues, progress reports by each technical options committee, including that of the Halons Technical Options Committee on progress with decision XXIX/8 on future availability of halons and their alternatives, and organizational and membership issues;

(d) Volume 4: Critical-use nominations assessment, interim report (May 2018);

(e) Volume 5: Decision XXIX/10: Issues related to energy efficiency while phasing down hydrofluorocarbons (May 2018).

17. Under agenda item 4, the Panel will present volumes 3 and 4 of its 2018 report and inform the parties on its progress with its report on the laboratory and analytical procedures, covering the following five sub-items:

(a) Nominations for critical-use exemptions for methyl bromide for 2019 and 2020;

(b) Progress in the implementation of decision XXIX/8 on future availability of halons and their alternatives;

(c) Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol (decision XXVI/5);

(d) Process agents (decision XVII/6);

(e) Organizational and other matters.

18. The information and recommendations of the Panel set out in volumes 3, 4 and 5 to be issued in May 2018 (see paragraph 16 above) will be summarized in the addendum to the present note, which is to be made available to the parties before the fortieth meeting of the Open-ended Working Group.

19. The Panel will give separate presentations on its report on hydrochlorofluorocarbons (HCFCs) (volume 1), destruction technologies (volume 2) and energy efficiency (volume 5) under agenda items 7, 3 (b) and 6 (a) respectively.

(a) Nominations for critical-use exemptions for methyl bromide for 2019 and 2020

20. In 2018, two Article 5 parties (Argentina and South Africa) submitted four nominations for critical-use exemptions for 2019, and two non-Article 5 parties (Australia and Canada) submitted one nomination each for 2020 and 2019 respectively. China, which has put forward methyl bromide nominations in recent years, has notified the Secretariat that it does not intend to submit further nominations for critical uses.

21. During its meeting held in Melbourne, Australia, from 5 to 9 March 2018, the Methyl Bromide Technical Options Committee reviewed, among other things, the critical-use nominations and additional information submitted by the nominating parties in response to the first round of questions by the Committee. The interim recommendations on the quantities of methyl bromide eligible for exemption will be included in the report of the Committee, to be made available in volume 4 of the Technology and Economic Assessment Panel 2018 report. The interim recommendations and associated information will be summarized in the addendum to the present note. Meanwhile, the

parties that have submitted nominations for critical-use exemptions and the quantities that they have nominated for 2019 and 2020 are listed in the table below.

Summary of the nominations for 2019 and 2020 critical-use exemptions for methyl bromide submitted in 2018 (tonnes)[a]

Parties not operating under paragraph 1 of Article 5 and sectors	*Nomination for 2019*	*Nomination for 2020*
1. Australia		
Strawberry runners		28.98
2. Canada		
Strawberry runners	5.261	
Subtotal	**5.261**	**28.98**

Parties operating under paragraph 1 of Article 5 and sectors	*Nomination for 2019*
3. Argentina	
Tomato (protected)	44.4
Strawberry fruit (open field)	27.1
4. South Africa	
Mills	2.0
Structures	45.0
Subtotal	**118.5**
GRAND TOTAL	**123.761** **28.98**

[a] Tonne = metric ton.

(b) Progress in the implementation of decision XXIX/8 on future availability of halons and their alternatives

22. In its decision XXIX/8 on future availability of halons and their alternatives, based on the progress report of the Halons Technical Options Committee contained in the 2017 Technology and Economic Assessment Panel report, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, through its Halons Technical Options Committee, to (i) continue to liaise with the International Civil Aviation Organization on the development and implementation of alternatives to halons, and their rate of adoption by civil aviation, and to report thereon in its 2018 progress report; (ii) explore the possibility of forming a joint working group with the International Civil Aviation Organization to carry out a study to determine the current and projected future quantities of halons installed in civil aviation fire protection systems, the associated uses and releases of those halons and any potential courses of action to reduce those uses and releases; and (iii) submit a report on the work of the joint working group, if established, before the Thirtieth Meeting of the Parties and the fortieth session of the Assembly of International Civil Aviation Organization.

23. A progress report on that issue by the Halons Technical Options Committee is expected to be included in the 2018 report of the Panel.

(c) Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol (decision XXVI/5)

24. By its decision XXVI/5, the Twenty-Sixth Meeting of the Parties extended the global laboratory and analytical-use exemption until 31 December 2021, under the conditions set out in annex II to the report of the Sixth Meeting of the Parties and decisions XV/8, XVI/16 and XVIII/15, for all controlled substances except those listed in Annex C, group 1 (i.e., HCFCs). In the same decision, the Meeting of the Parties requested the Technology and Economic Assessment Panel to report no later than 2018 on the development and availability of laboratory and analytical procedures that could be performed without using controlled substances. The Panel, in its presentation, is expected to inform the Open-ended Working Group on the progress made in preparing its report.

(d) Process agents (decision XVII/6)

25. In paragraph 7 of its decision XVII/6 on process agents, the Seventeenth Meeting of the Parties requested the Technology and Economic Assessment Panel to review the information submitted in accordance with the decision and to report and make recommendations to the parties at their Twentieth Meeting, in 2008, and every other year thereafter, on process-agent use exemptions, on insignificant

emission associated with a use, and process-agent uses that could be added to or deleted from table A of decision X/14.

26. In paragraph 8 of the same decision, the Meeting of the Parties also requested parties with process-agent uses to submit data to the Technology and Economic Assessment Panel by 31 December 2007 and 31 December of each subsequent year on opportunities to reduce emissions listed in table B and for the Panel to review in 2008, and every other year thereafter, emissions in table B of decision X/14, taking into account information and data reported by the parties in accordance with that decision, and to recommend any reductions to the make-up and maximum emission on the basis of that review. On the basis of those recommendations, the Parties were to decide on reductions to the make-up and maximum emissions with respect to table B.

27. The Technology and Economic Assessment Panel 2018 report is expected to provide a review pursuant to that decision. A summary of the review will be provided in the addendum to the present note.

28. Furthermore, by its decision XXIX/7 on the use of controlled substances as process agents, the Twenty-Ninth Meeting of the Parties agreed to update table A of decision X/14 and urged parties to update their information on the use of controlled substances as process agents and to provide the Secretariat, by 31 December 2017, with information on the implementation and development of emissions reduction techniques. China, the European Union and the United States of America submitted relevant information. By the same decision, the Meeting of the Parties also requested the Technology and Economic Assessment Panel to report to the Open-ended Working Group at its forty-first meeting on the industrial application of any alternative technologies employed by parties in the processes listed in table A, as updated by the decision. The information will be presented by the Panel at the forty-first meeting of the Open-ended Working Group.

(e) Organizational and other matters

29. The report of the Technology and Economic Assessment Panel normally contains information on organizational and administrative issues relating to the work of the Panel and its technical options committees. The Secretariat will include, in the addendum to the present note, any organizational and administrative issues discussed in the 2018 report of the Panel.

30. In the addendum to the present note, the Secretariat will also summarize any other key issues that the Panel raises in its report that may need the attention of the parties. Parties may also wish to raise issues of concern to be discussed by the Open-ended Working Group.

Agenda item 5

Linkages between hydrochlorofluorocarbons and hydrofluorocarbons in transitioning to low-global-warming-potential alternatives (UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, para. 162)

31. At the Twenty-Ninth Meeting of the Parties, the representative of Saudi Arabia introduced the subject of linkages between HCFCs and HFCs, with particular reference to paragraphs 6–8 of decision XXVIII/2. He explained that his country's concern was to avoid the need for industry to carry out a double transition, from HCFCs to high-global-warming-potential HFCs and subsequently to low-global-warming-potential alternatives. In paragraph 6 of decision XXVIII/2, the parties had recognized a need for flexibility if no other technically proven and economically viable alternatives were available. A mechanism to put that principle into effect was needed. While Saudi Arabia did not have firm proposals to put forward and was not expecting a decision to be taken at the time, the representative wished to signal the importance of the issue to Article 5 parties and to encourage a constructive discussion on the topic.

32. During the discussion, parties expressed their views on the issue raised by the representative of Saudi Arabia (see UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, paras. 155–161). Some of the concerns raised during the discussion were related to the availability of suitable technology and substances to replace HCFCs, the particular needs of low-volume consuming countries, the need to avoid double conversions and the specific challenges of high-ambient-temperature countries with alternative technologies in some sectors. A number of representatives drew attention to the provisions of decision XXVIII/2, in which parties had envisaged the possibility of deferring consideration of the HCFC compliance status of any party operating under a high-ambient-temperature exemption. They also pointed out the role of the Montreal Protocol in providing information rather than prescribing the use of particular technology.

33. The Co-Chair acknowledged the concerns of the parties, and the parties agreed to include the issue on the agenda of the fortieth meeting of the Open-ended Working Group (UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, para. 162). The Working Group may wish to further discuss the matter to develop a way forward.

Agenda item 6

Issues related to energy efficiency while phasing down hydrofluorocarbons (decision XXIX/10)

(a) Report by the Technology and Economic Assessment Panel on energy efficiency in the refrigeration, air-conditioning and heat pump sectors

34. In its decision XXIX/10, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, in relation to maintaining and/or enhancing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors, including in high-ambient-temperature conditions, while phasing down hydrofluorocarbons under the Kigali Amendment to the Montreal Protocol in Article 5 parties, to assess the following items:

(a) Technology options and requirements including:

(i) Challenges to their uptake;

(ii) Their long-term sustainable performance and viability;

(iii) Their environmental benefits in terms of carbon dioxide equivalents;

(b) Capacity-building and servicing sector requirements in the refrigeration and air-conditioning and heat-pump sectors;

(c) Related costs including capital and operating costs.

35. In the same decision, the parties also requested the Panel "to provide an overview of the activities and funding provided by other relevant institutions, as well as definitions, criteria and methodologies used in addressing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors in relation to maintaining and/or enhancing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors while phasing down hydrofluorocarbons under the Kigali Amendment to the Montreal Protocol, as well as those related to low-global-warming-potential (GWP) and zero-GWP hydrofluorocarbon alternatives including on different financing modalities".

36. The Panel was further requested "to prepare a final report for consideration by the Open-ended Working Group at its fortieth meeting, and thereafter an updated final report to be submitted to the Thirtieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer taking into consideration the outcome of the workshop described in paragraph 4 [of the same decision]" (see paras. 38–40 below regarding the workshop).

37. The Technology and Economic Assessment Panel is expected to finalize its report in response to that decision in May 2018. The addendum to the present note will set out the summary of the report.

(b) Outcome of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons

38. In decision XXIX/10, the parties requested the Secretariat to organize a workshop on energy efficiency opportunities while phasing down hydrofluorocarbons, at the fortieth meeting of the Open-ended Working Group. The workshop will be held on 9 and 10 July 2018 immediately prior to the Open-ended Working Group meeting.

39. The request for a workshop was based on the parties' recognition of the importance of maintaining and/or enhancing energy efficiency while transitioning away from high-GWP HFCs to low-GWP alternatives in the refrigeration, air-conditioning and heat pump sectors; that the use of air-conditioning and refrigeration is growing in countries operating under paragraph 1 of Article 5; and that maintaining or enhancing energy efficiency could have significant climate benefits. The workshop has been designed to provide a forum to discuss:

(a) Technical opportunities to improve energy efficiency in the refrigeration, air-conditioning and heat pump sectors;

(b) Investment, financial and policy aspects that can maximize energy efficiency improvements in refrigeration, air-conditioning and heat pump systems while phasing down the use of HFCs.

40. The conclusions of the workshop will be presented to the Open-ended Working Group, which may wish to discuss and consider further action that may be taken on energy efficiency and make recommendations as appropriate.

Agenda item 7

Requirements for hydrochlorofluorocarbons for the period from 2020 to 2030 for parties not operating under paragraph 1 of Article 5 of the Protocol (decision XXIX/9)

41. In its decision XXIX/9 on hydrochlorofluorocarbons and decision XXVII/5, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, in relation to Annex C, group I, substances (i.e., HCFCs), to assess requirements for the period from 2020 to 2030 for non-Article 5 parties and to provide information on the following:

(a) Areas and volumes of possible needs in fire suppression sectors that may require the use of clean agents;

(b) Areas and volumes of possible needs for solvent applications, including servicing;

(c) Areas and volumes of possible other niche uses;

(d) Existing or emerging applications and processes for alternatives related to items (a) to (c) above and the possibility of meeting identified needs through the use of recycled or reclaimed HCFCs.

42. In the same decision, the Twenty-Ninth Meeting of the Parties invited parties and other interested entities to provide additional information to the Secretariat by 15 January 2018 for inclusion in the Panel's progress report, and requested the Panel to report on the matter by 15 March 2018. Nine parties, namely Armenia, Azerbaijan, Canada, Costa Rica, Japan, Kazakhstan, Mexico, Palau and the Bolivarian Republic of Venezuela, as well as an interested entity in the United States of America, submitted information. The substantive parts of parties' submissions will be compiled in a separate document and will be posted on the meeting portal for the fortieth meeting of the Open-ended Working Group.

43. The Panel established a Working Group to respond to the decision, and its report was issued in March 2018. The Executive Summary of the report has been reproduced in annex III to the present note. The key conclusions of the Working Group may be summarized as follows:

(a) In fire protection, the volumes of HCFC-123 needed for the production of HCFC-based Blend B is estimated not to exceed 750 tonnes annually. Combined with potential amounts required for servicing, the total consumption may reach about 900 tonnes annually, or almost 20 ODP tonnes. Some specific continued uses of HCFCs include (i) aircraft rescue and firefighting at commercial and military airports; and (ii) in fixed fire protection systems in merchant shipping and military systems needing maintenance until the end of their economic lifetime. Some of the needs for HCFCs for fire protection may also be met through recycling and reclamation, for example from large (centrifugal) chillers;

(b) Any current solvent and other niche HCFC uses beyond 2020 might be around 250–500 tonnes (tens of ODP tonnes) annually, out of which about 50–200 tonnes are estimated for the annual HCFC requirements for existing aerospace or military equipment;

(c) The Panel suggested that parties may wish to consider how to treat HCFC solvent uses in several manufacturing processes that use HCFCs as solvents in a manner similar to process agent uses, which would potentially be impacted by the 2020 control measures for HCFC production and consumption in non-Article 5 parties. The total known annual use of HCFCs has been estimated at about 10 tonnes.

44. The Open-ended Working Group may wish to discuss the matter and recommend a way forward as appropriate.

Agenda item 8

Consideration of senior expert nominations from parties to the Technology and Economic Assessment Panel (decision XXIX/20)

45. In its decision XXIX/20, the Twenty-Ninth Meeting of the Parties appointed co-chairs of technical options committees and senior expert members of the Technology and Economic

Assessment Panel. The senior experts were appointed to serve on the Panel for one year, until the end of 2018.

46. During the discussion of the issue, parties were encouraged to hold consultations on potential nominations of senior experts and to refer to the matrix of expertise needed by the Panel prior to making nominations for appointments of senior experts.

47. The parties may wish to discuss further how they will consult on potential nominations and to consider any senior expert nominations to the Panel that may be submitted by parties on the basis of the matrix of expertise required.

III. Progress on decisions that will be addressed by the Thirtieth Meeting of the Parties

Ongoing progress on tabular overview of safety standards pursuant to decision XXIX/11 on safety standards

48. By its decision XXIX/11 on safety standards, the Twenty-Ninth Meeting of the Parties requested the Secretariat to hold regular consultations with the relevant standards bodies referred to in paragraph 7 of decision XXVIII/4 with a view to providing, with regard to standards for flammable low-GWP refrigerants, a tabular overview of relevant safety standards, drawing on the 2017 report of the task force on decision XXVIII/4 and the outcome of the consultations. The tabular overview should also include any relevant information submitted on a voluntary basis to the Secretariat by parties or by national and regional standards bodies.

49. The ongoing progress by the Secretariat on the issue will be summarized in a note entitled "Tabular overview of safety standards: progress to date", which will be made available under the background documents section in the meeting portal for the fortieth meeting of the Open-ended Working Group. Parties may wish to review the information and provide any comments and guidance to the Secretariat in the margins of the meeting for its presentation as an information note at the Thirtieth Meeting of the Parties.

Status of the work of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in developing guidelines for funding the phase-down of HFCs under decision XXVIII/2

50. By paragraph 10 of its decision XXVIII/2, the Twenty-Eighth Meeting of the Parties requested the Executive Committee to develop, within two years of the adoption of the Amendment, guidelines for financing the phase-down of HFC consumption and production, including cost-effectiveness thresholds, and to present those guidelines to the Meeting of the Parties for the parties' views and inputs before their finalization by the Executive Committee. At the Twenty-Ninth Meeting of the Parties, the report of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (UNEP/OzL.Pro.29/6), covering the activities undertaken by the Executive Committee since the Twenty-Eighth Meeting of the Parties, was issued and presented orally by the Chair of the Committee. The report consisted of four parts, dealing with policy matters related to the Kigali Amendment; other policy matters; projects, their implementation and monitoring; and business planning, administrative and financial matters.

51. The draft template of the cost guidelines (UNEP/OzL.Pro/ExCom/80/59, annex XXVIII) referred to in the report of the Executive Committee to the Twenty-Ninth Meeting of the Parties contains the principles agreed upon in decision XXVIII/2 and elements of the cost guidelines, including flexibility in implementation; the cut-off date for eligible capacity; second and third conversions; sustained aggregate reductions in HFC consumption and production; categories eligible for incremental costs; and eligibility of Annex F substances subject to high-ambient-temperature exemptions. Annex I of the report of the Executive Committee (UNEP/OzL.Pro/29/6) contains the decisions taken by the Committee so far on the matters arising from the Kigali Amendment, including those on the cost guidelines. The Executive Committee reported that it had agreed to submit the cost guidelines to the Thirtieth Meeting of the Parties and to finalize the guidelines as soon as possible thereafter.

52. The eighty-first meeting of the Executive Committee is scheduled to be held in Montreal from 18 to 22 June 2018, during which further discussion on developing guidelines for financing HFC phase-down is expected to take place. A comprehensive note on the guidelines will be presented to the Meeting of the Parties for the views and inputs of the parties.

Preparation of a results-based budget pursuant to decision XXIX/24 on financial reports and budgets for the Montreal Protocol on Substances that Deplete the Ozone Layer

53. In paragraph 12 of decision XXIX/24, the Twenty-Ninth Meeting of the Parties requested the Executive Secretary to prepare results-based budgets and work programmes for the years 2019 and 2020, presenting two budget scenarios and work programmes based on projected needs for the biennium in (a) a zero nominal growth scenario; and (b) a scenario based on further recommended adjustments to the first scenario and the added costs or savings related thereto. An advance version of the budget document[4] for the Thirtieth Meeting of the Parties is available to the parties in the meeting portal for the fortieth meeting of the Open-ended Working Group for information.

54. The document presents a proposed revision to the approved budget for 2018 and proposed budgets for 2019 and 2020 for the Trust Fund for the Montreal Protocol in the form of results-based budgets. The document describes the rationale and methodology used by the Secretariat to define the results framework. As a transitional measure, the budgets are also presented in the traditional format.

[4] UNEP/OzL.Pro.30/4.

Annex I

Recommendations for list of approved destruction technologies

The existing list of approved destruction technologies is shown in the table below in green. Recommendations relevant to this assessment are shown in red (for the assessment of the applicability of approved destruction technologies to HFCs and any other technologies for possible inclusion on the list of approved destruction technologies).

Technology	Applicability										
	Concentrated sources									Dilute sources	
	Annex A		Annex B			Annex C	Annex E	Annex F			Annex F
	Group 1	Group 2	Group 1	Group 2	Group 3	Group 1	Group 1	Group 1	Group 2		Group 1
	Primary CFCs	Halons	Other CFCs	Carbon tetrachloride	Methyl chloroform	HCFCs	Methyl bromide	HFCs	HFC-23	ODS	HFCs
DRE	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	95%	95%
Cement kilns	Approved	Not approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Gaseous/fume oxidation	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Recommend for approval	Recommend for approval		
Liquid injection incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Municipal solid waste incineration										Approved	High potential
Porous thermal reactor	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Recommend for approval	High potential		
Reactor cracking	Approved	Not approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Rotary kiln incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential	Approved	
Argon plasma arc	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Inductively coupled radio frequency plasma	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Microwave plasma	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Nitrogen plasma arc	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Portable plasma arc	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Chemical reaction with H_2 and CO_2	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		

Technology	Applicability										
	Concentrated sources									Dilute sources	
	Annex A		Annex B			Annex C	Annex E	Annex F			Annex F
	Group 1	Group 2	Group 1	Group 2	Group 3	Group 1	Group 1	Group 1	Group 2		Group 1
	Primary CFCs	Halons	Other CFCs	Carbon tetrachloride	Methyl chloroform	HCFCs	Methyl bromide	HFCs	HFC-23	ODS	HFCs
DRE	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	95%	95%
Gas phase catalytic dehalogenation	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Superheated steam reactor	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Thermal reaction with methane	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Electric heater								High potential	High potential		
Fixed hearth incinerator	Unable to assess										
Furnaces								Unable to assess			
Thermal decay of methyl bromide							Unable to assess				
Air plasma arc	Unable to assess										
Alternating current plasma	Unable to assess										
CO_2 plasma	Unable to assess										
Steam plasma	Unable to assess										
Catalytic destruction											Unable to assess
Chlorination/de-chlorination to vinylidene chloride	Not a destruction technology										
Solid alkali reaction	Unable to Access										

Abbreviation: DRE, destruction and removal efficiency; ODS, ozone-depleting substances.

Annex II

Summary of recommendations for each technology listed in annex I[a]

A written summary of the recommendations that resulted from the assessment of existing approved technologies and other technologies for possible inclusion in the list of approved technologies is provided below.

1. Approved destruction technologies for ozone-depleting substances and their applicability to HFCs

Cement kilns: At the time of writing, no specific data on destruction and removal efficiency or relevant emissions were available for assessment of HFC destruction against the performance criteria. Cement kilns are recommended as having high potential for applicability to HFC destruction, including HFC-23.

Gaseous/fume oxidation: Given the availability of information on demonstrated destruction of HFCs that meet the performance criteria, gaseous/fume oxidation is recommended for approval for applicability to HFC destruction, including HFC-23, using HFC-23 data as a proxy for other HFCs.

Liquid injection incineration: In 2002, the Task Force on Destruction Technologies (TFDT) reported dioxin/furan emissions data that were higher than the performance criteria for the destruction of ozone-depleting substances. At the time of writing, no data were available to confirm dioxin/furan emissions for HFC-134a destruction, and no data were provided for HFC-23 performance or destruction; therefore, liquid injection incineration is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Municipal solid waste incineration: No dioxin/furan emissions data were available to the 2018 TFDT at the time of writing, and the dioxin/furan emissions were higher than the criteria for ozone-depleting substances as noted in the 2002 TFDT report. Municipal solid waste incineration is recommended as having high potential for applicability to destruction of dilute HFC sources (except for HFC-23), specifically for the destruction of HFC blowing agents in foam.

Porous thermal reactor: Porous thermal reactor is recommended for approval for applicability to HFC destruction, except for HFC-23, for which no data was available for assessment. Porous thermal reactor is recommended as having high potential for applicability to HFC-23 destruction.

Reactor cracking: At the time of writing, no specific emission data for particulates were available for assessment against the performance criteria. Reactor cracking is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Rotary kiln incineration: No HFC performance data is presently available to undertake a performance criteria assessment on rotary kiln incineration; therefore, rotary kiln incineration is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Argon plasma arc: At the time of writing, either emissions data are higher than performance criteria (for CO) or are presently unavailable to undertake a performance criteria assessment; therefore, argon plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Inductively coupled radio frequency plasma: Due to insufficient data being available at the time of writing, the 2018 TFDT is unable to assess inductively coupled radio frequency plasma for applicability for HFC destruction.

Microwave plasma: Due to insufficient data being available at the time of writing, the 2018 TFDT is unable to assess microwave plasma for applicability for HFC destruction.

Nitrogen plasma arc: Information available at the time of writing this report indicated that reported particulate and HF emissions are above the performance criteria; therefore, nitrogen plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Portable plasma arc: No data were available for HCl and dioxin/furan emissions at the time of writing. Portable plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

[a] The format has been altered from the original version in the report of the task force.

Chemical reaction with H_2 and CO_2: In the absence of emissions data demonstrating it meets the performance criteria for particulates and dioxins/furans, chemical reaction with H_2 and CO_2 is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Gas phase catalytic de-halogenation: No dioxin/furan emissions data for HFC destruction were available to the 2018 TFDT at the time of writing. Although the 2002 TFDT report noted that the TFDT believed that the dioxin/furan emissions would be comparable to those from rotary kilns, no actual emissions data were available at the time. Gas phase catalytic de-halogenation is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Superheated steam reactor: In the absence of emissions data demonstrating it meets the performance criteria for particulates, superheated steam reactor is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Thermal reaction with methane: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess thermal reaction with methane to confirm its applicability to HFC destruction.

2. *Other technologies for possible inclusion in the list of approved destruction technologies*

Electric heater: Data on particulate emissions that meet the performance criteria are unavailable at this time. Additional destruction and removal efficiency and more elaboration on the measurement of emission results would be useful, noting the general reporting of nil results. Electric heater use is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Fixed hearth incinerator: No other data to assess the technology was provided. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess fixed hearth incinerators for possible inclusion on the list of approved destruction technologies. Also, the operating temperature appears to be lower than recommended in the European Union submission for destruction of HFCs.

Furnaces dedicated to manufacturing: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess furnaces dedicated to manufacturing for possible inclusion on the list of approved destruction technologies.

Thermal decay of methyl bromide: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess thermal decay of methyl bromide for possible inclusion on the list of approved technologies. The Technology and Economic Assessment Panel would welcome data to enable it to complete an assessment of this technology.

Air plasma arc: No other data to assess the technology were provided. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess air plasma arc for possible inclusion on the list of approved destruction technologies.

Alternating current plasma (AC plasma): Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess AC plasma arc for possible inclusion on the list of approved destruction technologies.

CO_2 plasma: Given that insufficient data that meets the performance criteria were available at the time of writing, the 2018 TFDT is unable to assess CO_2 plasma arc for possible inclusion on the list of approved destruction technologies.

Steam plasma arc: The 2018 TFDT has been unable to contact the technology owner to verify the earlier assessment for all of the performance criteria. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess steam plasma arc for possible inclusion on the list of approved destruction technologies.

Catalytic destruction: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess catalytic destruction for possible inclusion on the list of approved destruction technologies.

Chlorination/de-chlorination to vinylidene chloride: The submission by the United States of America provided information about the conversion of HFC-152a to vinylidene fluoride (or vinyl fluoride), which is a commercial chemical production process used at chemical production plants in the United States of America, where HFC-152a is either a feedstock or a chemical intermediate. The HFC-152a undergoes a chlorination and de-chlorination process to produce vinylidene fluoride. The technology is part of a chemical manufacturing process and not a destruction process.

Solid alkali reaction: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess solid alkali reaction for possible inclusion on the list of approved destruction technologies.

Annex III

Report of the Technology and Economic Assessment Panel (March 2018) Volume 1

Technology and Economic Assessment Panel decision XXIX/9 Working Group report on hydrochlorofluorocarbons and decision XXVII/5

Executive summary[a]

1. In its decision XXIX/9 on hydrochlorofluorocarbons (HCFCs) and decision XXVII/5, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel to provide further assessment of the issues related to the phase-out of HCFCs, provided in response to decisions XXVII/5 and XXVIII/8, and requested parties to provide relevant information for use by the Panel in providing the assessment.

2. The Panel appreciates the responses it has received from Armenia, Azerbaijan, Canada, Costa Rica, Japan, Kazakhstan, Mexico, Palau, the Bolivarian Republic of Venezuela and an interested entity in the United States of America, and has incorporated the information where appropriate in the present assessment.

3. With regard to fire protection, the decision XXVIII/8 report estimate remains unchanged, namely that for parties not operating under paragraph 1 of Article 5 (non-Article 5 parties) between 2020 and 2030 (as an upper limit for planning purposes and to assess impacts on the environment), volumes of HCFC-123 (for the production of HCFC-based Blend B) not exceeding 750 tonnes annually could be needed (combined with potential amounts required for servicing, this would imply a total consumption of about 900 tonnes annually, or almost 20 ODP tonnes).

- In fire protection, the earlier decision XXVII/5 report identified an application – aircraft rescue and firefighting at commercial and military airports – where certain requirements may currently only be met through the original halon 1211 or the use of an HCFC product, HCFC Blend B, in jurisdictions where their use is still allowable. On the basis of existing alternatives and current technology options, the Panel considered in its report that there was some likelihood that there might be aircraft rescue and firefighting applications that would continue to need clean agents in the 2020–2030 timeframe that can currently only be met through the supply of halon 1211 or HCFC Blend B. (The Panel noted several new fire extinguishing agents under development that might change the situation in the near future. One zero-ODP agent has recently been evaluated in aircraft rescue and firefighting applications, the results of which had not been published at the time of writing.)

- An HCFC blend was also used in fixed fire protection systems to replace halon 1301. This was particularly true in parties that pursued early action to begin to eliminate halon 1301 in new systems. The blend consists of HCFC-22, HCFC-123 and HCFC-124. The Panel is aware that those systems are still used today in merchant shipping and military systems and are expected to continue until the end of their economic lifetime. While no new HCFC blend systems are expected to be installed today or in the future, there is a need to continue to maintain the systems. Therefore, a small amount of HCFCs will also be needed to supply re-charge of the systems during the period 2020–2030. The Panel does not have sufficient data to project quantities needed for the systems, but would estimate that they would be less than those needed for HCFC Blend B in portable/steaming systems used to replace halon 1211.

- The possibility of meeting fire protection needs for HCFCs through the use of recycled or reclaimed HCFCs was addressed in the previous decision XXVII/5 report and the situation remains the same. Recyclers of firefighting agents and refrigerants report that there are only small quantities of HCFC-123 being recycled at present. The main use of HCFC-123 is as a cleaning agent and as a low-pressure refrigerant in large (centrifugal) chillers. While the small amount being recycled may change as older chillers are phased out and replaced with non-HCFC-123 equipment, at this stage it does not appear that there will be a sufficient quantity of HCFC-123 to meet the

[a] The executive summary has been lightly edited.

potential demand of HCFC Blend B for aircraft rescue and firefighting applications in the period beginning in 2020, assuming that no new agents meet the approval of authorities having jurisdiction for this specific application beginning in 2020. The recyclers also report that there is no technical reason that they are aware of at this time that would prevent them from being able to recycle or reclaim HCFC-123 to appropriate purity levels sufficient for use in HCFC Blend B.

4. Solvent and other niche uses of HCFCs have been considered for non-Article 5 parties between 2020 and 2030. On the basis of the available information, if current solvent and other niche HCFC uses continue beyond 2020, annual use might be around 250–500 tonnes (10s of ODP tonnes). Of that amount, about 50–200 tonnes are estimated for the annual HCFC requirements for existing aerospace or military equipment. The estimated amounts indicate those potentially needed to supply solvent and other niche applications as discussed below. Recycling may be feasible although relevant amounts have not been estimated in the absence of available information.

- The decision XXVIII/8 finding that it is possible that some niche solvent applications, such as aerospace or military, might require small quantities of HCFCs to service existing equipment (e.g., HCFC-121, -122a, -141b and -225ca/cb) remains unchanged.
- The decision XXVIII/8 finding that essential uses for non-Article 5 parties are likely to be required in small quantities for laboratory and analytical uses, and for the research into and development of new substances, remains unchanged.
- There is a possibility that HCFC-225 may be required after 2020 in Japan for a solvent application that coats silicone oil on the surface of the needle/syringe to reduce pain at injection, at a rate of around a few hundred tonnes annually. At this time, the Panel is unaware of other non-Article 5 parties that may have this application.
- Several manufacturing processes use HCFCs as solvents in processes that might be considered similar to process agent uses, and potentially would be impacted by the 2020 control measures for HCFC production and consumption in non-Article 5 parties. Known applications include processes using HCFC-141b and HCFC-225ca/cb as solvents. The total known use of HCFCs in such processes has been revised downwards to about 10 tonnes annually. There is a small possibility that such HCFC use may remain after 2020 if alternatives cannot be found by then. Parties may wish to consider how to treat HCFC solvent uses in processes that are similar to process agent uses in relation to the 2020 control measures under Article 2.
- The Panel has become aware of an aerosol application using HCFCs in the Russian Federation. HCFC-22 and HCFC-141b are used as propellant and solvent respectively in a topical medical aerosol application in quantities of around 20 tonnes per year. With the variety of technically and economically feasible alternatives, HCFCs used in aerosols are unlikely to be justifiable as an essential use in non-Article 5 parties.